

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
23 February 2006 (23.02.2006)

PCT

(10) International Publication Number  
**WO 2006/020810 A3**

(51) International Patent Classification:  
E21B 23/00 (2006.01)

(21) International Application Number:

PCT/US2005/028642

(22) International Filing Date: 11 August 2005 (11.08.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/600,679 11 August 2004 (11.08.2004) US

(71) Applicant (for all designated States except US): EVEN-  
TURE GLOBAL TECHNOLOGY, LLC [US/US];  
15995 North Barkers Landing, Suite 350, Houston, TX  
77084 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): BRISCO, David,  
Paul [US/US]; 405 Westridge Drive, Duncan, OK 73533  
(US). WATSON, Brock, Wayne [US/US]; 2535 Marsh  
Lane, # 1004, Carrollton, TX 75006 (US). SHUSTER,  
Mark [US/US]; 19115 Prospekt Lane, Houston, TX  
77094 (US). GRAY, Malcolm [US/US]; 1502 Wagon Gap  
Trail, Houston, TX 77010 (US). GRINBERG, Grigoriy  
[US/US]; 4758 Mouni Airy, Sylvania, OH 43560 (US).

COSTA, Scott [US/US]; 25614 Broadcrest Court, Katy,  
TX 77494 (US). WASSON, Russell [US/US]; 2647  
Highway J, Bourbon, MO 65441 (US).

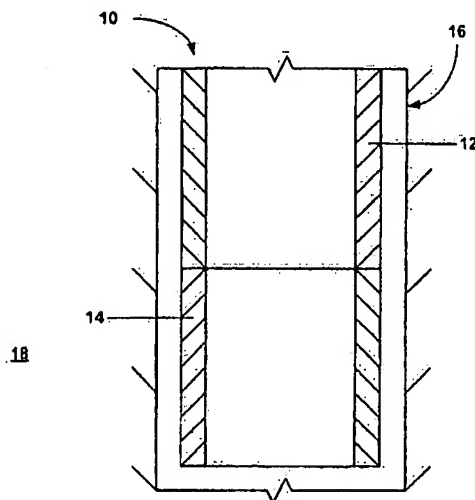
(74) Agent: HAYNES AND BOONE LLP; Suite 3100, 901  
Main Street, Dallas, TX 75202 (US).

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, GR, GU, HK, HN, ID, IL, IN, IS, JP, KE,  
KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,  
MD, MG, MK, MN, MW, MX, MY, NA, NG, NI, NO, NZ,  
OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL,  
SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC,  
VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every  
kind of regional protection available): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,  
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,  
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,  
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: RADIAL EXPANSION SYSTEM



(57) Abstract: A method of radially expanding and plastically deforming tubular members (10, 100, 200) is provided that includes selecting a tubular member, determining an anisotropy value and a strain hardening value for the selected tubular member (10, 100, 200), multiplying the anisotropy value times the strain hardening value to generate an expandability value for the selected tubular member (10, 100, 200); and if the expandability value is greater than 0.12, then radially expanding and plastically deforming the selected tubular member (10, 100, 200).

WO 2006/020810 A3



**Declaration under Rule 4.17:**

- *of inventorship (Rule 4.17(iv))*

**Published:**

- *with international search report*
- *with amended claims*

**(88) Date of publication of the International search report:**  
31 August 2006

**Date of publication of the amended claims:** 9 November 2006

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## AMENDED CLAIMS

[received by the International Bureau on 12 September 2006 (12.09.06);  
original claims 1, 2, 6, 12, and 13 amended;  
remaining claims unchanged (2 pages)]

1. A method of selecting a tubular member based on its suitability for expansion, comprising:
  - determining an anisotropy value for a tubular member;
  - determining a strain hardening value for the tubular member;
  - multiplying the anisotropy value times the strain hardening value to generate an expandability value for the tubular member; and
  - selecting the tubular member for expansion based on the generated expandability value.
2. The method of claim 1, wherein an expandability value greater than 0.12 indicates that the tubular member is suitable for radial expansion and plastic deformation.
3. The method of claim 1, wherein the tubular member comprises a wellbore casing.
4. The method of claim 1, wherein the tubular member comprises a pipeline.
5. The method of claim 1, wherein the tubular member comprises a structural support.
6. A method of radially expanding and plastically deforming tubular members, comprising:
  - selecting a tubular member;
  - determining an anisotropy value for the selected tubular member;
  - determining a strain hardening value for the selected tubular member;
  - multiplying the anisotropy value times the strain hardening value to generate an expandability value for the selected tubular member; and
  - if the expandability value is greater than 0.12, then radially expanding and plastically deforming the selected tubular member.
7. The method of claim 6, wherein the tubular member comprises a wellbore casing.
8. The method of claim 6, wherein the tubular member comprises a pipeline.
9. The method of claim 6, wherein the tubular member comprises a structural support.

10. The method of claim 6, wherein radially expanding and plastically deforming the selected tubular member comprises:

Inserting the selected tubular member into a preexisting structure; and  
then radially expanding and plastically deforming the selected tubular member.

11. The method of claim 10, wherein the preexisting structure comprises a wellbore that traverses a subterranean formation.

12. A method of selecting tubular members for radial expansion and plastic deformation, comprising:

selecting a tubular member from a collection of tubular members;

determining a carbon content of the selected tubular member;

determining a carbon equivalent value for the selected tubular member; and

If the carbon content of the selected tubular member is less than or equal to 0.12 percent and the carbon equivalent value for the selected tubular member is less than 0.21, then determining that the selected tubular member is suitable for radial expansion and plastic deformation.

13. A method of selecting tubular members for radial expansion and plastic deformation, comprising:

selecting a tubular member from a collection of tubular members;

determining a carbon content of the selected tubular member;

determining a carbon equivalent value for the selected tubular member; and

if the carbon content of the selected tubular member is greater than 0.12 percent and the carbon equivalent value for the selected tubular member is less than 0.36, then determining that the selected tubular member is suitable for radial expansion and plastic deformation.